

# Closing the Gap between Science and Society:

## Keywords

- Outreach
- Broader impacts
- Public engagement
- Science engagement
- Citizen or community science
- Science literacy

Gaps between science and society – and between people and nature – have led to a call from high-level scientists for greater scientist-initiated public engagement (Bell *et al.* 2009; Foote *et al.* 2009).

# Broader Impacts (NSF)

The Project Description must contain, as a separate section within the narrative, a discussion of the broader impacts of the proposed activities... NSF values the advancement of scientific knowledge and activities that contribute to the achievement of *societally relevant outcomes*. Nine outcomes include, but are not limited to:

- Full participation of women, persons with disabilities and underrepresented minorities in STEM.
- Improved STEM education and educator development at any level.
- Increased public scientific literacy and public engagement with science and technology.
- Improved well-being of individuals in society.
- Development of a diverse, globally competitive STEM workforce.
- Increased partnerships between academia, industry and others.
- Improved national security.
- Increased economic competitiveness of the U.S.
- Enhanced infrastructure for research and education.

Five Tips for your Broader Impact Statements: <https://beta.nsf.gov/science-matters/nsf-101-five-tips-your-broader-impacts-statement>

# Broader Impacts Review Criteria

National Science Foundation Letter to Colleagues:

<https://www.nsf.gov/pubs/2007/nsf07046/nsf07046.jsp>

- Advance discovery and understanding while promoting teaching, training, and learning
- Broaden participation of under-represented groups
- Enhance infrastructure for research and education
- Broaden dissemination to enhance scientific and technological understanding
- Benefits to society

...not every proposal must demonstrate impact in each of these pre-defined areas. Rather, activities with significant broader impact will emerge from the nature of the proposal and the authentic interests of the proposer.

# Nadkarni and Stasch's (2013) Recommendations

(based on review of BI statements from 296 funded Ecosystem Studies proposals)

Five recommendations of broader Impacts activities:

- (1) reach much broader audiences than students alone;
- (2) be very specific with respect to target audience;
- (3) be genuinely collaborative with social scientists, outreach specialists, and users of content;
- (4) involve the public in “real” science; and
- (5) explicitly engage underrepresented groups.



# Other Thoughts

- Look to add components that are active (vs passive) learning or engagement
- Consider new or *innovative* broader impacts and tap into novel interest groups, etc.
- Demonstrated or *pre-existing commitment* of activity is more credible than promises
- Actively harness existing infrastructure (e.g., community website/projects such as iNaturalist, GenBank, BOLD)
- Partner with others whose primary mission is education, engagement, and outreach
- Seek out interdisciplinary collaborations
- Fold in assessment measures; assessment components are especially compelling (?necessary) for educational efforts involving students
- Outreach is time-intensive and expensive...fund it (commit money from your budget)

The Evolving Culture of Science Engagement is an initiative to explore how the public connects to science, how science connects to the public, and how it's all changing in the 21st century. What are the new strategies, sensibilities, and settings of science communication and education? <http://www.cultureofscienceengagement.net/>



# Science Engagement

Download the report: <http://www.cultureofscienceengagement.net/2013convening/report>

# Eight Dimensions of Change

Among other topics, the workshop explored eight dimensions of change—six chosen in advance by the organizers and two nominated by the participants:

1. **Story(telling):** A resurgence of personal storytelling in contemporary culture has helped science communicators humanize what might otherwise be bloodless scientific ideas; telling stories also shifts some of the focus from the *objects* of science (phenomena, facts, etc.) to the *subjects*, the people doing science and their personalities, drives, doubts, etc.
2. **Humor:** Although it carries risks (e.g., of trivialization or exclusion), humor can help make science welcome and relevant in other contexts; it can link relatively obscure material to familiar ideas, help put scientists and non-scientists on a level playing field, and foster a sense of community and connection.
3. **Mystery and the unknown:** Focusing on what we can't yet grasp taps into a basic human attraction to the unknown, makes certain subjects “grabby” to non-experts, and conveys the idea that science isn't finished yet—that it's a living enterprise with room for others to participate.
4. **Informality/science as part of everyday life:** A sense of casualness, playfulness, and spontaneity are evident in many of today's science engagement programs, helping audiences feel more comfortable when encountering science and lowering the barriers between science and other areas of contemporary life.

5. **Artistic expression:** The interest of visual and performing artists in exploring science as both subject-matter and method seems to be increasing, as does the range of collaborations between artists and scientists in diverse settings; both can help foster perceptions that science is a creative, human way of exploring the world.
6. **Participatory engagement:** The rising popularity of dialogue events, citizen science projects, and other forms of public participation in scientific research and policy-making is one of the most noteworthy shifts in the culture of science engagement; it alters the definition of authority and lets non-experts identify with science.
7. **Emotion:** An emotional connection can be a powerful “way in” to a science experience for non-experts, capturing initial attention and increasing feelings of bonding with the communicator or educator as well as the subject; but it can include negative emotions as well as positive ones, and requires a vulnerability that may be difficult for some practitioners.
8. **Power, barriers, and belonging:** Participants pointed out that the community of science engagement practitioners is not sufficiently diverse, nor are its audiences; to move past this longstanding problem, the field may need to focus less on science literacy and learning goals and more on engaging communities on their own terms, for their own purposes.

Participants also discussed several themes that emerged from those initial discussions, including learning; civic engagement; affiliation and community; the difference between a desire to inspire or otherwise affect audiences and a desire to express or create something on the part of the science communicator; and how the shared goal of mainstreaming science can be accomplished without losing the “edge” of creativity and cultural innovation that marks so much of today’s practice.



# A few examples

- Radio lab
- [Skype a Scientist](#) (Sarah McAnulty at UConn)
- YouTube shorts and channels
- e.g., Emily Graslie's [Brain Scoop](#)
  - some [Best Shows](#)
- Blogs, social media accounts, etc.
- Get involved with Keney Park Sustainability Project or their new Nature and Wellness Center

An aerial photograph of the Keney Park Sustainability Project. The image shows a large, rectangular garden area with numerous raised garden beds, some of which are filled with green plants. A wooden fence surrounds the garden. In the background, there is a large, white, rectangular building with a flat roof. To the right of the building, there is a red, two-story house with a balcony. A paved road runs along the right side of the garden, and a silver car is parked on it. The overall scene is a well-maintained community garden in an urban setting.

# KENEY PARK

# SUSTAINABILITY PROJECT

Keney Park Sustainability Project implements its mission by providing hands-on training, on site demonstrations, outreach and community collaborations that help families become more self sustainable and environmentally conscious.

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